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NESTS OF THE DICKCISSEL.

- (a) South of Galatin, Illinois. June 6, 1907. Five Eggs.
(b) Atwood, Douglas Co., Illinois. August 12, 1918. Four Eggs.

THE AUK:

A QUARTERLY JOURNAL OF

ORNITHOLOGY.

VOL. XXXVIII.

JANUARY, 1921.

No. 1

THE DICKCISSEL (*SPIZA AMERICANA*) OF THE ILLINOIS PRAIRIES.

BY ALFRED O. GROSS, PH. D.

Plates I-IV.

I. INTRODUCTION.

To one who journeys along the dusty roads of Central Illinois on a hot summer day, there is nothing that relieves the quiet monotony of the sunny open landscape more than the earnest, incessant calls of the Dickcissel. Even the farmer and the layman, whose chief interests may be in the dollars and cents of the productive grain fields, cannot fail to have their attention attracted by this bird as it loudly and lustily announces its presence. The clear accented notes of the monotonous song at once suggest the bird's common name—Dickcissel. In the middle west it is popularly and generally known as the "Little Meadowlark," a name that has arisen because of its resemblance in miniature to the common Meadowlark. Indeed, some very intelligent farmers believe the Dickcissels to be merely small individuals of the larger and well known bird. The name Black-throated Bunting, so often met with in the writings of the older authors, is now less used by bird students. By the typical westerner who knows the Dickcissel intimately, he is often referred to as "Dick."

The Dickcissel contributes not only its beauty and song to its environment but does its bit in the economy of nature by consuming scores of destructive insects, as well as hundreds of seeds of obnoxious weeds, harmful to the crops. In Central Illinois where the Dickcissel is at its best, it ranks among the most abundant and important birds from an economic point of view. The ornithological writings contain many notes pertaining to the distribution of the Dickcissel, but very little has been contributed on the life history of this interesting and important bird, which deserves better and more general recognition. For this reason the author feels that no apology is necessary in presenting the results of this study.

Most of the notes on the life history, behavior, etc., were obtained from a study of birds and nests found on the farm of C. W. Wilson, and adjoining farms, near the village of Atwood, Douglas County, Illinois, during the summer of 1918. Records made by the author while conducting the field work of a statistical bird survey of Illinois in 1906-1907 and 1909 are also included.

The author wishes to express his thanks to Prof. S. A. Forbes for the use of the Illinois State Laboratory records, from which the statistical tables in the third division of this paper were compiled; to Prof. Frank Smith, of the University of Illinois, and to Mr. T. E. Musselman, of Quincy, Illinois, for the use of their excellent records of migrations; to Mr. E. R. Kalmbach, of the U. S. Bureau of Biological Survey, and Mr. A. N. Caudell, of the U. S. Bureau of Entomology, for the determination of plant and animal matter found in the stomachs and crops of the birds; to the Museum of Comparative Zoölogy, Cambridge, for the loan of its series of Dickcissel skins; and to Dr. E. L. Mark for reading and correcting the manuscript.

II. GEOGRAPHICAL RANGE.

The nesting range of the Dickcissel is now limited chiefly to the region of the middle west between the Alleghanies and the Rocky Mountains and from Michigan^{1, 2} Wisconsin,³ Minnesota,^{3, 4} and

¹ Gibbs, Dr. Morris. 1879, Bull. U. S. Geol. and Geog. Surv. Terr., vol. 5, p. 487.

² Barrows, W. B. 1912, Michigan Bird Life, pp. 537-539.

³ Cooke, W. W. 1888, U. S. Dept. of Agr. Bull., no. 2, pp. 220-221.

⁴ Roberts, T. S., and Benner, F. 1880, Bull. Nutt. Orn. Club, vol. 5, p. 15.

North Dakota,^{5, 6} south to Alabama,⁷ Mississippi,⁸ Louisiana,^{9, 10} and Texas^{11, 12, 13, 14} casually straying as far west as Arizona,^{15, 16, 17} New Mexico and California.¹⁷ There is a nesting record as far north as Point Pelee, Ontario, June 1, 1884,¹⁸ but I know of no recent reports of this bird breeding north of the 47th parallel and nests above 43° latitude are rare. Audubon¹⁹ in 1838 stated that the Dickcissel was rare in Ohio and scarce in Kentucky, but today it is not uncommon in the western sections of these two states. Prof. A. B. Brooks reports seeing a pair of Dickcissels on July 5-8, 1907, at Buchannon, Upshur County, West Virginia. It is now abundant and, according to numerous reports, is apparently becoming more so throughout Indiana, Illinois, Missouri, Iowa, Kansas, Nebraska and South Dakota. It breeds in the plains east of the mountains of Colorado^{20, 21} and Wyoming.¹⁷ One pair of supposedly breeding birds has recently been reported from Wahpeton, North Dakota.⁶

In the time of Alexander Wilson²² the Dickcissel was a common summer resident east of the Alleghany Mountains and even in the latter part of the nineteenth century, not more than thirty to forty years ago, there were many records of its occurrence and of its nesting along the Atlantic seaboard. Its breeding range extended from South Carolina²³ up through Pennsylvania,^{19, 24, 25}

⁵ Allen, J. A. 1874, Proc. Bost. Soc. N. H., vol. 17, pp. 12, 29 and 59.

⁶ Jensen, J. K. 1918, Auk, vol. 35, p. 348.

⁷ Golsan, L. S., and Holt, E. G. 1914, Auk, vol. 31, p. 229.

⁸ Hay, O. P. 1882, Bull. Nutt. Orn. Club, vol. 7, p. 92.

⁹ Allison, A. 1904, Auk, vol. 21, pp. 472-484.

¹⁰ Kopman, H. H. 1915, Auk, vol. 32, p. 28.

¹¹ Dresser, H. E. 1865, Ibis, vol. 1, new series, p. 490.

¹² Attwater, H. P. 1892, Auk, vol. 9, p. 339.

¹³ Sennett, Geo. B. 1879, Bull. U. S. Geol. and Geog. Surv. Terr., vol. 5, p. 392.

¹⁴ Simmons, G. F. 1915, Auk, vol. 32, p. 329.

¹⁵ Henshaw, H. W. 1873, Rep. Orn. Spec. Wheeler's Survey, p. 119.

¹⁶ Scott, W. E. D. 1887, Auk, vol. 4, pp. 196-205.

¹⁷ Bailey, F. M. 1904, Handbook of Birds of Western U. S., p. 377.

¹⁸ Saunders, W. E. 1885, Auk, vol. 2, pp. 307-308.

¹⁹ Audubon, J. J. 1838, Ornith. Biog., vol. 4, pp. 579-580.

²⁰ Cooke, W. W. 1898, Bull. Colo. Agric. Col., p. 167.

²¹ Ridgway, R. 1873, Bull. Essex Inst., vol. 5, pp. 183-195.

²² Wilson, A. 1811, Amer. Ornith., vol. 3, p. 86.

²³ Loomis, L. M. 1885, Auk, vol. 2, p. 192; and 1891, Auk, vol. 8, p. 168.

²⁴ Rhoads, S. N. 1903, Cassinia, VIII, pp. 17-28.

²⁵ Trotter, S. 1879, Bull. Nutt. Orn. Club, vol. 4, p. 235.

New Jersey²⁴, ²⁶, ²⁷ and New York²⁸, ²⁹, ³⁰ to Rhode Island³¹ and Massachusetts.¹⁹, ³², ³³, ³⁴ Stragglers of the Dickcissel have been collected as far south as Florida³⁵, ³⁶ and as far north and east as New Hampshire,⁴⁰ Maine,³⁷, ³⁸, ³⁹ and Nova Scotia.⁴¹ The last record of its nesting east of the Alleghanies, so far as I know, is that of W. DeW. Miller,²⁶ who found a nest at Plainfield, New Jersey, on July 3, 1904. The Dickcissel now seems destined to become eliminated as a breeding bird in the eastern section of its former range if it is not so already. S. N. Rhoads,²⁴ in his very interesting historical account of the Dickcissel, does not attempt to offer a final solution of this remarkable and puzzling change in the limits of the Dickcissel's distribution, but he offers some interesting suggestions on the subject. Some ornithologists are inclined to doubt whether the Dickcissel was as abundant in the eastern United States as the writings of the older authors would lead us to believe.

The winter range of the Dickcissel extends as far south as northern South America (Colombia and Trinidad Island). Its migration is made through Mexico and Central America but there are occasional records of migration by way of Swan Island in the Caribbean Sea, and even as far east as Jamaica.

III. ABUNDANCE AND DISTRIBUTION OF THE DICKCISSEL IN ILLINOIS.

In marked contrast to its status in the eastern section of its former range, this bird is, as I have said, apparently becoming more abundant in the middle west. In comparing the older with

²⁶ Miller, W. DeW. 1904, Auk, vol. 21, p. 487.

²⁷ Chapman, F. 1891, Auk, vol. 8, p. 395.

²⁸ Dutcher, W. 1893, Auk, vol. 10, p. 276; and 1889, Auk, vol. 6, p. 137.

²⁹ Dwight, J., Jr. 1897, Auk, vol. 14, p. 95.

³⁰ Johnson, F. E. 1891, Auk, vol. 8, p. 116.

³¹ Robinson, W. 1889, Auk, vol. 6, p. 194.

³² Purdie, H. A. 1878, Bull. Nutt. Orn. Club, vol. 3, p. 45.

³³ Brewer, T. M. 1878, Bull. Nutt. Orn. Club, vol. 3, p. 190.

³⁴ Deane, R. 1879, Bull. Nutt. Orn. Club, vol. 4, pp. 122-123.

³⁵ Beckham, C. W. 1882, Bull. Nutt. Orn. Club, vol. 7, p. 250.

³⁶ Scott, W. E. D. 1889, Auk, vol. 6, pp. 318-326.

³⁷ Knight, Ora W. 1897, Bull. Univ. Maine, no. 3, p. 103.

³⁸ Townsend, C. W. 1885, Auk, vol. 2, p. 106.

³⁹ Norton, A. H. 1893, Auk, vol. 10, p. 302; and 1894, vol. 11, pp. 78-79.

⁴⁰ White, F. B. 1919, Auk, vol. 36, p. 288.

⁴¹ Dwight, J., Jr. 1903, Auk, vol. 20, p. 440.

the more recent records of abundance, this increase is especially noticeable in the northern section of Illinois, as well as along the northern limits of its present range. Unfortunately, there is a personal factor to be reckoned with in considering the records of general abundance by different authors, so that comparisons thus made are often misleading. Furthermore, students of birds may report a bird as common or abundant when their information is based on general impressions received from a study of one or of a limited number of localities. It may be that little or no thought is given to the abundance or density of the species as compared with all the species of birds which occur in the entire region considered. To say that the Dickcissel is common means one thing to one observer and something else to another. There is urgent need for more specific information on this important matter in relation to all our birds. It is to Prof. S. A. Forbes, of the Illinois State Laboratory of Natural History, that we are indebted for planning and carrying out the statistical ornithological survey of Illinois, the first survey of its kind ever made for any extensive area. The details of the methods employed by Professor Forbes, as well as some of the more general results obtained, may be learned by referring to his two preliminary reports: 'An Ornithological Cross-section of Illinois in Autumn,'⁴⁵ and 'The Mid-summer Bird Life of Illinois: A Statistical Study.'⁴⁶

For purposes of this paper only the work accomplished by the survey during the summer months, when the Dickcissel was present, will be considered. For convenience, the state was divided into three sections: northern, central, and southern. In each section a locality, comprising several counties, typical for that part of the state, was selected and trips were made on foot in various directions. Accompanied by an assistant the author of this paper, who had charge of the field work, traveled through the fields and noted as he went the species and number of birds flushed on a strip fifty yards in width, including those flying across the strip within one hundred yards to the front. A record was also kept, by means of pedometers and mechanical counters, of the distances traveled over each area. When all the records

⁴⁵ Forbes, S. A., 1907, Bull. Ill. State Lab. Nat. Hist., VII, pp. 305-335.

⁴⁶ Forbes, S. A., 1908, Amer. Nat. 42, pp. 505-519.

were accumulated and tabulated it was a simple matter to ascertain the relative abundance and density of each species for each kind of crop and area and for the state as a whole. While the data are not yet sufficient in amount to yield absolute results in all cases, they do provide by far the most reliable statistics in existence concerning the abundance of the common birds of the Illinois fields.

In 1907, a month was spent in each of the three sections of the state: June in southern, July in central, and August in northern Illinois. For many birds the observations were made at a time when their population was comparatively stable and not greatly affected by migratory movements. By beginning in the south and ending in the north the differences, due to changing conditions, were reduced but not entirely eliminated. In 1909 the work was repeated with an effort to avoid the disturbing factor of seasonal variation by spending only about ten days at a time, instead of a month, in each section. Thus every section was visited each month and therefore in its turn three times during the summer.

The following tables, I and II, containing the general statistics for the summers of 1907 and 1909, respectively, are intended to serve as a means of comparing the work of the survey of the two summers, and especially that relating to the Dickcissel.

TABLE I.
GENERAL STATISTICS ILLINOIS BIRD SURVEY—SUMMER, 1907.

Section	Time	Acres on which birds were counted	No. of birds counted on 50-yd. strip	No. of species	No. of Dickcissels counted on 50-yd. strip	No. of Dickcissels per square mile	Order of Dickcissel abundance
Northern Illinois	July 29– Aug. 23	3172	3026	66	53	10.69	16th
Central Illinois	July 9– July 24	2117	2047	49	136	41.12	5th
Southern Illinois	June 4– July 1	2504	2667	70	204	52.14	4th
Totals		7793	7740	85	393	32.2	5th

TABLE II.
GENERAL STATISTICS ILLINOIS BIRD SURVEY—SUMMER, 1909.

Section	Time	Acres on which birds were counted	No. of birds counted on 50-yd. strip	No. of species	No. of Dickcissels counted on 50-yd. strip	No. of Dickcissels per square mile	Order of Dickcissel abundance
Northern Illinois	June 30– Sept. 15	4794	7647	71	96	12.83	5th
Central Illinois	June 22– Sept. 4	3807	6368	67	147	24.72	5th
Southern Illinois	June 8– Aug. 26	3023	3973	81	110	23.28	7th
Totals		11624	17988	117	353	18.9	11th

The statistics of the above tables give us concrete evidence of the great abundance of the Dickcissel and emphasize the importance of the species in the economic ornithology of the middle west. In 1909, out of 85 species recorded for the whole state, the Dickcissel ranked fifth in the abundance of individual birds, and in 1909, among the 177 species observed, it stands eleventh. According to these data there are, during the summer months in the 56,000 square miles of the state, more than a million Dickcissels busily engaged in protecting valuable crops from the devastating grasshoppers. Surely such an army of useful workers is not to be ignored in these strenuous times of conservation.

The density of the Dickcissel population of southern Illinois is practically the same as it is in the central part of the state; whereas in the northern third of the state the number of Dickcissels per square mile is very much less. This marked difference is correlated with the fact that northern Illinois, about 42° lat., is near the northern limit of the summer range of this bird.

The following table, No. III, gives one an insight into the distribution of the Dickcissel on the various crops. The table includes those areas on which twelve or more of the birds were

counted, arranged in order, beginning at the left with the one which contained the largest number of Dickcissels per square mile.

TABLE III.

CROPS AND AREAS OF ILLINOIS ON WHICH AT LEAST 12 BIRDS WERE SEEN
WITHIN THE 50-YARD STRIP—SUMMER, 1909.

Crops	Meadow	Waste and Fallow	Oats	Wheat and Rye	Pasture	Corn
Acres.....	1501.35	423.96	1166.02	385.81	2265.57	3941.51
Miles (linear)....	82.85	23.37	64.14	21.22	124.69	216.81
Square miles.....	2.339	.668	1.822	.609	3.530	6.151
All birds seen with- in 50-yd. strip...	2113	464	1022	452	4228	4789
Dickcissels.....	190	23	39	12	44	32
Percentage of Dick cissels among all birds seen.....	8.94	4.95	3.81	2.65	1.04	.066
Dickcissels per sq. mile.....	81.2	34.4	21.4	19.7	12.4	5.2

The above table shows the Dickcissel to be preeminently a bird of the meadows, where, for the state as a whole, its concentration is 81.2 birds to the square mile. It is attracted to the meadows not only by the many grasshoppers and other insects found there, which supply much of its sustenance, but also by the dense low vegetation, which provides nesting sites well adapted for the type of nest built by the Dickcissel. Those meadows which have the densest growth, such as clover and alfalfa, are preferred to those of timothy or other grass.

The pastures, though presenting conditions similar to those of meadows, were found to contain a Dickcissel population of only about twelve to the square mile. This much smaller number in pastures is to be explained not by the difference in the character of the vegetation but by the continual disturbance which the nesting birds receive from the grazing stock.

The waste and fallow ground areas, which rank next to the meadows in numbers of Dickcissels per square mile, have a vege-



HABITATS OF THE DICKCISSEL.

- (a) Clover Field on a Middle West Prairie. Near Lincoln, Logan Co., Illinois. July 16, 1907.
- (b) Timothy Field. Near Benton, Franklin Co., Illinois. June 4, 1907.

tation favorable for attracting these birds and are situations least disturbed, for here not even the plow and the devastating mower or binder ever bring the home life of the birds to a sudden and disastrous ending.

In the grain fields the Dickcissel is present in numbers intermediate between those of the meadows and pastures. The number found per square mile on oats is practically the same as that on the wheat and rye fields.

Of all the areas listed in the table, the cornfields, as one might anticipate, contain the lowest density of Dickcissel life, because they provide neither food nor favorable nesting sites to lure the Dickcissels from other fields. Furthermore, the period of cultivating the soil coincides with the early part of the nesting season of the Dickcissel so that any nests built in cornfields would certainly be destroyed. The small number of these birds found in cornfields, only five to the square mile, were there accidentally. It was not uncommon to find that the cornstalks bordering meadows were used as the favorite alighting places for the singing males, as well as vantage points for the female in approaching her concealed nest. All birds thus seen within the fifty-yard strip were of course included in the count for the cornfields. A most significant fact is that only 6/100 of one per cent. of all the birds seen in the cornfields were Dickcissels; whereas, in meadows they comprised almost nine per cent. of the total bird population.

Other areas in which the Dickcissel was recorded, but in numbers too small to be included in Table III, are as follows: Swamp 3; Shrubbery 3; Gardens 3; Timber 3; and Orchards 1.

No Dickcissels were observed in house or barn yards, in plowed ground or stubble fields.

The following Table IV is a list of the twelve most abundant birds, observed during the summer survey of 1909, arranged in order beginning with the one represented by the largest number of individuals. It will aid the reader in realizing the numerical position of the Dickcissel among the abundant birds of Illinois. These twelve birds, of which the Dickcissel is the eleventh, comprise more than 76 per cent. of the total bird population of the state and hence are the species which deserve most attention when considering the economic ornithology of the middle west

states. The figures were obtained in the same manner described in connection with the earlier tables.

TABLE IV.

THE TWELVE COMMONEST BIRDS WITH THE NUMBERS OF EACH SPECIES
SEEN WITHIN THE FIFTY-YARD STRIP ON ALL AREAS INCLUDED
IN THE SURVEY OF THE STATE—SUMMER, 1909.

Order of abundance	Common name	Total no. seen
1	English Sparrow	4239
2	Bronzed Grackle	2455
3	Cowbird	1845
4	Meadowlark	1434
5	Mourning Dove	670
6	Bobolink	631
7	Red-winged Blackbird	573
8	Flicker	419
9	Robin	417
10	Prairie Horned Lark	414
11	Dickcissel	353
12	Crow	287
Total		13737

Two characteristic habitats of the Dickcissel are shown in Plate II. The clover field photographed July 16, 1907, near Lincoln, Logan County, Illinois, one of the last in the vicinity to be harvested, was virtually alive with birds. The author located seven nests of the Dickcissel containing eggs or young in this field and there were many young birds in juvenal plumage seen perched on the Canada thistles and other weeds. In addition to the Dickcissel nests there were two nests of the Grasshopper Sparrow, one of the Vesper Sparrow, two of the Meadowlark, and one of the Upland Plover. Other birds found in the same ecological association were the Bob-white, Prairie Hen, Mourning Dove, Flicker, Prairie Horned Lark, Cowbird, Bronzed Grackle, Goldfinch, and English Sparrow.

The timothy field was photographed June 4, 1907, near Benton, Franklin County, in southern Illinois. Such fields, though

not as often selected as clover fields for a nesting site, harbor a large number of Dickcissel homes. In this field the author found two Dickcissel nests, one Meadowlark nest and a Quail nest containing sixteen eggs. The nests of the Dickcissel were concealed and protected by dew-berry vines in addition to the rank growth of grass. In the woods and shrubbery seen in the background of this view were Mourning Doves, Yellow-billed Cuckoos, Phoebes, Field Sparrows, Bachman's Sparrows, Scarlet Tanagers, Mockingbirds, Brown Thrashers and Carolina Wrens.

IV. MIGRATION.

The first male Dickcissels make their appearance in central Illinois about the last week of April or the first week of May. The females usually come about a week later, but the bulk of individuals are seldom seen until after the middle of May.

The following "first seen" records were made at Urbana, in east central Illinois by Prof. Frank Smith and others, during the past eighteen years. Field trips were made practically each day during the spring migrations, so that these records represent an accurate series of dates of the first appearances of the male birds. The average date of these eighteen years is May 3.

1901.....	May 7	1911.....	April 29
1902.....	May 2	1912.....	May 2
1903.....	May 16	1913.....	May 4
1904.....	May 5	1914.....	April 28
1905.....	May 11	1915.....	April 28
1906.....	May 5	1916.....	May 5
1907.....	May 5	1917.....	April 24
1908.....	April 25	1918.....	May 2
1909.....	April 29		
1910.....	May 10		

The following records from Quincy on the Mississippi River, the extreme western side of the State, were made by Mr. T. E. Musselman:

1910.....	April 30	1916.....	April 30
1911.....	April 21	1917.....	May 6
1912.....	April 25	1918.....	May 5
1913.....	April 28		

The average of the above dates of the first arrivals at Quincy is April 29—four days earlier than the average of those made at Urbana. If it is true that the vanguard of the birds which constitute the migration waves follow the large river courses, then the earlier dates at Quincy may be correlated with the fact that the city is situated on the Mississippi River, the main immigration route of the middle west.

Records of the spring migration of the Dickcissel made by Prof. Gates at Carthage College, Carthage, Illinois, show an average date of several days later than those at Quincy, Illinois. Although only forty miles north of Quincy, this place is near the headwaters of a stream tributary to the Illinois, therefore migration requires a longer time.

The fall migration of the Dickcissel has been given but scant attention by observers in central Illinois. The silent departure of these birds in autumn is nevertheless quite as interesting as their more heralded coming in the springtime. In August, at the close of the nesting season, the Dickcissels rove about for a short time as family groups, these soon unite with others, which in turn may join still larger aggregations to form roosts of several hundred individuals. In 1908 a roost which contained considerably more than 300 birds on August 20 had very few representatives on September 1, and by September 10 all had left, presumably for the southland. A roost under observation during the summer of 1918 was located along the banks of a large drainage ditch, the sides of which, for a distance of nearly a mile, were covered with giant rag-weeds and horse-weeds eight to ten feet in height. Although it is excessively hot and dry at this season of the year, the ditch contained cool refreshing water. This attractive feature, together with the admirable concealment and roost provided by the tall weeds, made an ideal concentration center for many Dickcissels. A few could be seen feeding on the seeds of the weeds or bathing in the water at almost every hour of the day, but the mass of individuals came in at twilight between sunset and dark. On August 5 there were only about fifty birds, on August 8 about 125, but August 10, 485 Dickcissels, adults and young, were counted and doubtless more than twice that number of birds were concealed by the dense growth of weeds

and thus escaped being seen. By August 15 there was a very perceptible diminution in the numbers at the roost and there is every reason to believe the fall migration had then begun. I was obliged to leave Illinois at this time, so records of the latest appearances at this roost were not made.

Most of the Dickcissels are gone from central Illinois by September 10 to 15, but some stragglers may linger several days longer. The latest record that I have is of a young male bird collected October 2, 1907.

V. DESCRIPTIONS AND MEASUREMENTS OF ADULT BIRDS.

The specimens of Dickcissels, upon which the following descriptions and measurements are based, were collected near Atwood, Illinois, during the summer of 1918. The colors were determined with the use of Ridgway's 'Color Standards and Nomenclature.' The numbers and letters following the names of the colors refer to the hue and tone respectively. The colors here given are at best approximations.

Nuptial plumage (adult male).—The top of the head, back and sides of the neck, lores and auriculars pale neutral gray (69''''d); crown and forehead tinged with olive-ocher (21''a), an amber yellow (21'b) line over the eye which becomes white posteriorly; back mouse gray (15''''a) tinged with cinnamon-drab (13''''a) and streaked with black; rump and tail coverts smoke gray (21''''d)* without streaks; lesser and middle wing coverts, cinnamon-rufous (11'i); edge of wing, empire yellow (21'b); secondaries, primaries and rectrices, fuscous (13''''k) and narrowly edged with pale mouse gray (15''''d); malar stripe, amber yellow (21'b) anteriorly, broadening posteriorly into a white area on either side of a black throat patch; chin white; breast wax yellow fading to pure white on the belly and under tail coverts; mandibles dusky slate-blue (40''m); the legs and feet Prout's brown (15'm); iris dark brown. (In male specimens in the nuptial plumage collected June–July there is a small black patch of variable size near the middle of the yellow breast and in all except one this spot is completely separated from the black area of the throat.)

* Cf. Color numbers in Ridgway's 'Nomenclature.'

Nuptial plumage (adult female).—The upper parts of the female are similar to those of the male, but the gray is represented by shades of brown; crown with fine black streaks and with very little yellow; the general coloration very much duller, especially the rufous of the wings and the yellow of the breast, which are much reduced in amount as compared with the male; in three specimens the rufous of the wings is practically absent, being instead gray and fuscous, the coverts being fuscous with only a few of the feathers margined with cinnamon-rufous (11'i); chin and throat white; pronounced black lateral chin stripes bordering the maize yellow (19f) malar stripes; (in six females the black throat patch, so conspicuous in the male, is entirely lacking but in one adult female taken August 2 there is a reduced patch of chaetura black (17'''m) on the throat which connects on either side with the lateral throat stripes); in all specimens, the straw yellow (21'd) breast finely streaked with dark brown; flanks white, washed with avellaneous (17'''b) and finely streaked with fuscous or brown; the primaries, secondaries, tail, bill and legs similar to the male. (The females collected during the late summer toward the close of the nesting season have a plumage that is very soiled and worn; the barbs of the outer tail feathers of some of the females collected in August were completely worn off, leaving nothing but the naked shafts. The plumage of the male is only slightly worn because his part in the rearing of the brood is small, as we will see in the next chapter.)

Adult winter plumage (male).—(This description is based on four specimens collected in Illinois during the first week of August, 1918, three specimens collected during the last week of August, 1908, at Matamoros, Mexico, and another collected at Bolson, Costa Rica, December 13, 1909. Two of the birds collected in Illinois are in a transitional state of the post-nuptial moult, but the others have acquired the complete winter plumage.) This plumage is similar to the nuptial plumage but the entire coloration is very much brighter and the bands and patches of colors more sharply differentiated. The gray of the pileum and neck of the nuptial plumage is replaced by a rich dark olive-brown (17'''k); back snuff brown (15''k) streaked with black; the rufous of the lesser and middle wing coverts a deep chestnut (9m) color; greater

wing coverts broadly edged with mikado brown (13''i) instead of gray as in the nuptial plumage; white edgings of the primaries very prominent; the yellow of the breast is more extensive anteriorly and posteriorly, even the middle of the belly being tinged with yellow; the yellow of the breast approaches cadmium yellow (17a); chin tinged with cream color (19'f); superciliary and malar stripes light cadmium (19a); the posterior part of the superciliary stripe light yellow and not white as in the nuptial plumage; the black throat patch reduced in size and is more or less obscured by pale cream tips of the feathers; no traces of black on the lower breast; auriculars and flanks plain olive-brown (17'''m); crissum or under tail coverts warm buff (17'd) instead of white as found in the nuptial plumage.

Adult winter plumage (female).—No females in the adult winter plumage were secured. Though all the males seen and collected had acquired the winter plumage by the time I left Illinois, which was August 15, the females were still in their nuptial plumage and only one of the specimens collected showed the beginnings of the post-nuptial moult. According to Dwight,⁴² in the female in plumages following the first nuptial, "the throat remains pale brown with lateral chin streaks without the black patch of the male and the colors elsewhere are regularly duller."

A description of the natal, juvenal and first winter plumages will be found under the account of the life history.

The following tables contain the measurements of the specimens upon which the preceding descriptions were based. These skins are now in the collection of the Lee Museum of Biology at Bowdoin College:

TABLE V.

MEASUREMENT OF MALES (CENTIMETERS) NUPTIAL PLUMAGE.					
Specimen number.....	35	39	40	72	85
Date, 1918.....	June 7	June 10	June 10	Aug. 2	Aug. 6
Bill.....	1.5	1.45	1.5	1.5	1.7
Wing.....	8.8	8.5	8.5	8.3	8.3
Length.....	18.1	16.8	17.9	17.8	18.0
Tail.....	6.7	6.4	6.2	6.3	6.1
Extent.....	....	....	....	27.0	27.1

⁴² 1899, Ann. N. Y. Acad. Sci., 13, pp. 216-218.

Tarsus with middle toe..	4.7	4.3	4.6	4.8	4.9
Tip to tip of toes.....	3.8	3.7	3.6	3.9	4.0
3rd or front middle toe nail.....	.64	.65	.68	.6	.69
1st or hind toe nail.....	.86	.78	.80	.72	.85
6th primary.....	5.8	5.3	5.2	5.5	5.7
3rd secondary.....	5.2	4.9	4.8	5.0	5.1
Weight, grams.....	....	....	....	30.7	32.9

TABLE VI.

MEASUREMENTS OF FEMALES (CENTIMETERS) NUPTIAL PLUMAGE.

Specimen number.	51	65	66	69	70	83	84
Date, 1918.....	July 17	July 31	July 31	Aug. 1	Aug. 2	Aug. 6	Aug. 6
Bill.....	1.4	1.4	1.5	1.5	1.5	1.4	1.5
Wing.....	7.6	7.8	7.6	7.3	7.5	7.3	7.2
Length.....	15.9	16.0	15.1	15.7	15.6	16.4	16.5
Tail.....	5.3	5.2	5.3	5.3	5.3	5.5	5.0
Extent.....	24.3	25.2	23.5	24.1	24.5	24.1	23.8
Tarsus with mid- dle toe.....	4.6	4.7	4.5	4.4	4.6	4.6	4.6
Tip to tip of toes..	3.8	3.9	3.6	3.9	3.8	3.5	3.8
3rd or front middle toe nail.....	.71	.70	.60	.68	.62	.70	.68
1st or hind toe nail	.81	.85	.80	.80	.78	.80	.81
6th primary.....	5.2	5.4	5.1	4.9	4.8	5.0	4.8
3rd secondary....	4.7	5.0	4.4	4.5	4.5	4.5	4.4
Weight, grams....	28.6	27.1	26.5	27.3	23.4	30.6	23.4

TABLE VII.

MEASUREMENTS OF MALES (CENTIMETERS).

79 and 105 adult winter plumage.

73 and 86 Intermediate between nuptial and adult winter plumages
in post nuptial moult.

Specimen number.....	73	79	86	105
Date, 1918.....	Aug. 2	Aug. 6	Aug. 6	Aug. 9
Bill.....	1.6	1.5	1.6	1.5
Wing.....	8.2	8.0	8.0	8.1
Length.....	15.6	17.4	14.6	17.9
Tail.....	3.8	6.2	3.4	6.3
Extent.....	26.8	26.5	26.8	26.6
Tarsus.....	5.0	4.8	5.2	4.9
Tip to tip of toes.....	4.2	3.8	4.3	4.0



NESTS OF THE DICKCISSEL.

- (a) Centralia, Marion Co., Illinois. July 15, 1909. Five Eggs.
(b) Atwood, Douglas Co., Illinois. July 2, 1918. Four Eggs.

3rd or front middle toe nail.....	.68	.65	.70	.64
1st or hind toe nail.....	.80	.82	.90	.85
6th primary.....	4.4	5.5	4.9	5.6
3rd secondary.....	5.1	4.5	4.8	5.0
Weight, grs.ms.....	32.8	36.7	32.3	35.8

VI. GENERAL ACTIVITIES AND BEHAVIOR.

The following notes on the behavior of the Dickcissel were made during the nesting season, a time when there was an opportunity to study the birds from blinds at close range. Certain features of behavior which might properly belong here are discussed under other topics of this paper.

The study of the home life of a pair of birds that built their nest in the tall weeds and grass along a country roadside, supplied many interesting incidents which help in portraying the character and behavior of the Dickcissel. This nest (Plate V, fig. 9) built about ten inches above the ground, was composed of materials loosely interwoven among the stems of the tall weeds and grass. The tops of the grass and weeds which arched over this little home, protected the eggs and young from the direct rays of the sun and concealed them from the view of all who might pass. The wires of a barbed-wire fence which ran through the thicket of weeds also aided in protecting the nest from stray animals or even from people who might trample on the fragile structure. The fence, as well as the telephone poles and wires, provided excellent sentinel posts for the male and desirable perches for the cautious female when she went to and from her nest.

A blind from which observations of the birds could easily be made was constructed in the tall weeds along the fence about twelve feet from the nest. It was completely covered with cut grasses and weeds which gave to the surroundings nothing striking or unusual that might arouse the suspicions of the birds and thus cause them to leave. On the day after the blind was built the home life of the birds was being conducted in an apparently normal way and, so far as could be determined, not the least attention was paid by the birds to the miniature studio erected on their premises. The female flew from the nest when I entered the blind the first time, but after a few minutes she returned to

the telephone wires overhead to utter in unison with her mate the usual chirps of disapproval. The two birds continued chirping for about twenty-five minutes, when the female flew down to the fence wires at a place very near the nest. Something seemed to arouse her suspicions for she returned almost immediately to her mate. She now exhibited a state of uneasiness, for she repeatedly flew back and forth between the telephone wires and the fence. Suddenly, and for no apparent reason except for deception, she flew a long distance across the fields, as if abandoning all desire to return to the nest. The male now ceased chirping and tuned up to his full song. In ten minutes the sagacious female returned to the telephone wire and, without any hesitancy, flew to the fence post nearest her nest. From that point she carefully surveyed all of her surroundings and especially scrutinized the blind where the monster in the shape of a human being had so recently disappeared. Just at this moment the male was singing louder than ever, but his mate did not utter the faintest chirp. When conditions seemed favorable to the female she slipped into the weeds and noiselessly and cautiously made her way to her secret treasures. The birds played their parts well and without doubt their shrewdness misleads many enemies. The performance described above was repeated on following visits to the nest, but after a few days the birds paid little or no attention to my coming or going nor did they seem to be disturbed by the teams and automobiles which passed along the road. Even when the driver sounded his horn directly opposite the nest the birds made no visible response. However, when an automobile or team stopped in the road near the brooding female she invariably scooted off the nest into the grass. If the actions of the people were free from suspicion, she returned to the nest; otherwise, she flew to the telephone wires to chirp until all danger was gone. The female used her usual precaution in returning to her nest while the male seemed to sing with the evident purpose of attracting any attention which might otherwise be directed toward his mate.

At the time of the hatching of the young there is a noticeable change in the behavior of the female, though the male seems unchanged and unmoved by this important event in his household.

The female becomes extremely fidgety and excitable, yet very daring, at the time of these new responsibilities. She exhibits a readiness to hazard many dangers which she would not have faced before her parental instincts had been quickened by the appearance of her young. At this time she will, without the least hesitancy, return to her nestlings while an observer stands in full view only a few yards distant. When the mother bird returned for the first time after the hatching of the young she uttered a series of low subdued notes which seemed like tender greetings. She then carried the egg shells away and dropped them at a place quite remote from the nest. This habit, which is held in common with many other birds, is a part of the good housekeeping of the Dickcissel. All refuse and filth from the young birds is also immediately carried away so that the nest and its surroundings always present a neat and clean appearance. The first food, a larva, was delivered to the young about thirty minutes after the latter had emerged from the egg. The larva was crushed into small pieces which were thrust, at intervals of several seconds, into the gaping mouth of the little wobbly creature. While the little Dickcissel was receiving its first dinner the male bird sat on top of his favorite telephone pole pouring forth a volume of song and seemingly oblivious to what was happening in the weeds and grass below him.

On the following day two more eggs were hatched, but the fourth egg was sterile and remained in the nest unbroken until after the fledgelings left, nine days later.

During the first three days the mother brooded her young very closely and left the nest only when it was necessary to obtain food. Even during the heat of the day when the mercury rose above 90° she clung closely to her nest. When the heat became excessive she panted incessantly and her partially spread wings protruded over the edge of the nest. Though she often presented an appearance of dire desperation, she always remained faithful to her family while the male did nothing but encourage her with his song. On the fourth and fifth days, the mother bird spent less time on the nest and from the sixth to the ninth days, when her ability became sorely taxed to satisfy the ever-increasing appetites of her young, she seldom lingered at the nest for any

length of time. Evidently it was unnecessary for the female to brood the young after the sixth and seventh days because the feathers and the contact of the young birds' bodies with one another easily retained the high body temperature without the aid of the parent. The temperature of nestlings six days old which had been left alone in the nest for an hour was 106° F. (normal for birds), while the surrounding temperature was only 80° F.

The Dickcissel attends strictly to his own affairs, seldom if ever meddling with the life of other birds. When strangers intrude on his premises he not only leaves them alone but often exhibits a marked timidity or cowardice. One day a young Kingbird alighted on the fence wire just above the Dickcissel's nest. It was followed by the parent Kingbird which continued to feed the fledgeling in that place for more than twenty minutes. During this time both of the Dickcissels were exceedingly disturbed but neither dared to offer any objection to the unbidden tyrant.

Many birds, such as Mourning Doves, Bobwhites, Vesper Sparrows, Migrant Shrikes and others, made their appearance about the nest, but at only one time did I see the Dickcissel muster enough courage to assert his feelings about the intrusion. One afternoon a young Dickcissel about three or four weeks old perched on the fence near the nest. As soon as the male saw the strange young bird he stopped his singing abruptly, ruffled his feathers and dashed at the innocent intruder with the ferociousness of a tiger. The scared stranger flew for his life and escaped in the tall weeds and grass. This incident seems to signify that the Dickcissel is ready to assert his authority over the younger of his own kind but is too much of a coward to tackle a bird as large or larger than himself.

When one thinks of the Dickcissel it is usually of a finely colored male perched on a high post or weed stalk pouring forth a volume of earnest and cheerful song. Because of these superficial qualities the male Dickcissel has become a favorite of many bird lovers, but as one becomes more intimately acquainted with the domestic life of the species the less one is apt to admire the male. He takes no part in nest building nor incubation; neither does he

help his mate during the busy time of feeding and caring for the young. The following narrative further justifies us in condemning him as a lazy husband and as a father utterly lacking resourcefulness when responsibilities are thrust upon him. The home where this tragedy was enacted was nestled among the fragrant clover blossoms where, throughout the sunny hours of the day, myriads of beautiful butterflies flitted about from flower to flower sipping the nectar from the clover cups. Loudly above the buzzing of the bumble bees one could hear at regular intervals the notes of the Dickcissel announcing, as well as words could tell, that his family was at home in the clover field. As I watched the male bird the female appeared beside him with a grasshopper nymph for her little ones. The male kept up his singing while his mate flitted nervously from place to place uttering a number of inquiring chirps. After deciding all was well she became quiet and then flew directly to her treasures which were hidden by a beautiful canopy of clover blossoms. A hurried visit to the spot revealed a nest and three birds about four days old, all in excellent condition (plate IV, fig. 7). I again visited this field of clover on the following morning to watch and enjoy the home life of this pair of birds. Their general activities were very much as they were on the preceding day; the female busily plied to and from the nest in a strenuous effort to satisfy three hungry mouths, while the male offered her no help and seemed to think he was "doing his bit" by singing for his family. All was going well in the life of this Dickcissel home when a calamity brought it to a sudden and disastrous ending. The faithful mother was in the act of carrying another tempting morsel to her young when she was taken unawares and carried away in the talons of a Sharp-shinned Hawk. Not more than a minute after this catastrophe, almost before one could come to the realization of what had happened, there came the familiar notes of the male from a post nearby. As I listened to him the thought came to me that he was now confronted by circumstances in which his part must necessarily be more than singing. It seemed to me fortunate for the three young that at least the male had been spared to continue the work so well begun. Throughout the morning the male kept up his singing and he was still at his post in the after-

noon. Early the next morning he was singing as loudly as ever but he made no effort to feed the now starving young. At noon I fed the pitiful creatures some grasshopper nymphs with the hope that the male bird would finally care for them, but on the following day, though the male was still singing, he was singing to ears that could no longer hear the notes that were meant for them.

VII. SONG.

The song of the Dickcissel is simple yet, like many bird notes, it is difficult to put it into words that will convey to the reader the author's interpretation. The song has been written in as many ways as there have been writers to attempt the description, so it seems needless to contribute another to the already long list of versions.

Wilson describes the song as consisting "only of five notes, or rather two: the first being repeated twice and slowly, the second thrice and rapidly, resembling 'tship tship tshe tshe tshe.'" Nuttall states: "With us the call is 'tie tie—tshe tshe tshe tship' and 'tship tship, tshe tshe tshe tshe tship.'" Dr. Elliott Coues interprets it as "Look! Look! see me here! see!" and again he writes, "the simple ditty sounds like chip-chip-chee, chee, chee." To the Rev. J. Hibbert Langville it sounds like "chic-chic-chèlac-chick-chick-chick" or "chick-ticktshe-chick-chick-chick." Amos W. Butler writes: "It comes to me characteristically as fine metallic sounds something like the noise made by dropping six silver dollars one upon the other into one's hand: clenk, clenk, clenk-clenk-clenk." Mr. Robert Ridgway writes: "They perch upon the summits of tall weed-stalks or fence stakes, at short intervals crying out: See, see, -Dick, Dick-cissel, cissel." This latter is a much quoted interpretation of the song and one which has given popularity to the common name, Dickcissel.

It is possible to imagine the Dickcissel singing almost any of the varied sets of words given above, yet to the reader who has never heard the song, some of these interpretations might be very misleading. If a person unfamiliar with the Dickcissel attempts to imitate some of them, they become ludicrous. If I were to select from the above list of descriptions the ones which

seem to best depict the character of the Dickcissel's song it would be a combination of the ones written by Nuttall and Ridgway, "See See,—Dick!, Dick!, tshe tshe tshe tship (or chisl)." A "tship!, tship!" can be substituted for "Dick!, Dick!," but the latter seems more appropriate when we consider its name. The "see see," which serves as a prelude, is very faint and not heard unless one is near the singer. These preliminary notes are often omitted and I have failed to hear some males utter them at all. The "Dick! Dick!" or "tship! tship!" is loud, strongly accented and repeated slowly. This note is usually uttered twice, but sometimes it may be sounded a third time. It is followed by a rapid succession of three or four notes which sound like "tshe" or "chee." The last note ends abruptly and is slightly different from the others, being more like "tship," and sometimes it resembles "chisl" or merely "isl." When the bird is weary, and often when the weather is excessively hot, the song is simplified to "Dick! Dick!-isl" and sometimes at irregular intervals it is merely "Dick! Dick!"

The Dickcissel begins singing as soon as it arrives in the spring, indeed, the presence of the male newcomer is usually made known by his loud characteristic call. During the nesting season the song can be heard at nearly all times of the day, but it is by no means the first of the bird voices to be heard in the morning. During the early morning hours, while waiting in my blind for the coming of dawn, the weird call of the Pheasants, the booming of the Prairie Hens, the cooing of the Mourning Doves, the whistled Bob-white calls and even the sweet notes of the Song and Vesper Sparrows were heard long before the Dickcissel added his voice to the chorus. As the day wore on and the heat increased the first voices were silenced one by one, but the Dickcissel kept up his singing with an undiminished earnestness. Even in the middle of the day, when the waves of heat that rose from the fields to an almost unbearable intensity drove most birds to cover, the song of the Dickcissel was still in evidence. The earnestness and persistence of the Dickcissel is a trait we are compelled to admire.

The songs of the Dickcissel follow in such rapid succession and in such regularity that a record of the number of calls per

minute during different times of the day are interesting. For this purpose a male was selected whose mate was brooding a nest of young a few yards from one of my blinds. The favorite perch of this bird was the top of a gnarled stump, the highest point in the neighborhood of the nest. The times of the day selected for the count were five o'clock and ten o'clock in the morning and a third count at noon. Counts of the number of songs per minute of other males made at various times on other days were similar so that the records presented represent a fair average condition.

TABLE VIII.

COUNTS OF THE NUMBER OF DICKCISSEL SONGS PER MINUTE.

(Time—5:05-5:21 A. M.)

1st minute, 12 calls	7th minute, 0 calls	12th minute, 10 calls
2nd " 5 "	8th " 0 "	13th " 13 "
3rd " 3 "	9th " 6 "	14th " 9 "
4th " 10 "	10th " 7 "	15th " 6 "
5th " 10 "	11th " 9 "	16th " 7 "
6th " 7 "		

In the above counts there are a total of 114 calls for the 16 minutes or an average of 7.1 calls per minute. Before the end of the 6th minute the bird left his perch, captured and ate a grasshopper and resumed his singing during the 9th minute.

TABLE IX.

COUNTS OF THE NUMBER OF DICKCISSEL SONGS PER MINUTE.

(Time—9:55-10:11 A. M.)

1st minute, 10 calls	7th minute, 8 calls	12th minute, 12 calls
2nd " 12 "	8th " 0 "	13th " 12 "
3rd " 9 "	9th " 0 "	14th " 8 "
4th " 9 "	10th " 0 "	15th " 2 "
5th " 9 "	11th " 12 "	16th " 10 "
6th " 10 "		

In the above counts there are a total of 122 calls for the 16 minutes and an average of 7.6 calls per minute.



NESTS OF THE DICKCISSEL.

- (a) Atwood, Douglas Co., Illinois. July 17, 1918. One Egg Hatching.
(b) Atwood, Douglas Co., Illinois. July 25, 1918. Three Young, Two Four Days Old and One Three Days Old.

TABLE X.

COUNTS OF THE NUMBER OF DICKCISSEL SONGS PER MINUTE.

(Time—12:00–12:16.)

1st minute, 10 calls	7th minute, 0 calls	12th minute, 5 calls
2nd " 13 "	8th " 13 "	13th " 7 "
3rd " 14 "	9th " 11 "	14th " 8 "
4th " 7 "	10th " 13 "	15th " 10 "
5th " 4 "	11th " 2 "	16th " 15 "
6th " 0 "		

In the last series of counts there is a total of 132 calls for the 16 minutes and an average of 8.2 calls per minute. It is in the last minute of the last trial that the Dickcissel reached the maximum number of 15 calls per minute, the highest count made during the summer. During that minute the song was uttered on an average of once every four seconds.

From a comparison of these counts, which are typical among many others, it is seen that the rate of the repetition does not diminish but actually increases in this case from 7.1, at five o'clock to more than eight calls per minute, during the intense heat of the midday sun. When the heat was excessive (above 100° F.) the quality of the song was greatly interfered with by the rapid respiration or panting of the bird; at such times the song was often a repetition of "tship, tship" without the prelude or the usual ending.

The Dickcissel is active for twelve to fourteen hours during the day, hence it will be seen that if the male maintains an average of seven repetitions per minute he will repeat his song about 400 times an hour or more than 5000 times during the day. Is it any great wonder that the song of the Dickcissel is described as monotonous and wearisome? I know of no bird which sings more frequently and continuously, neither the Red-eyed Vireo nor the Ovenbird is a match for him.

The average number of chirps, uttered by the female when disturbed, taken over similar periods of time as those shown above for the male, varied from ten to fifty per minute depending on the state of her excitement.

Though the Dickcissel is not the first to begin the morning bird song he is one of the latest singers at night. Even after

the glow of sunset is gone I have heard the voice of the Dickcissel sound above the hoarse calls of the toads and the varied tones of the myriads of singing insects. The only other bird note I heard on those prairie fields after the last Dickcissels had settled for the night was the shriek of a Screech Owl awakening from his day nap in the tall hedge across the field.

During the first or second week of August the clover fields and meadows, which during June and July resounded with the calls of the Dickcissel, became quiet. By the middle of August you may find a number of females still busy feeding and caring for their young, but the males have deserted their haunts to join others now at the secluded roosts. Here they change their nuptial suit for a new and brighter plumage before beginning their annual fall migration. Though these birds remain in the north several weeks longer, the male song is now silenced for another year, and to the casual observer the Dickcissels seem to have left their prairie homes for the southland.

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(To be continued.)

A NESTING OF THE PHILADELPHIA VIREO.

BY HARRISON F. LEWIS.

INTRODUCTION.

IN June and July, 1919, a nesting of the Philadelphia Vireo (*Vireosylva philadelphia* Cass.) took place on the grounds of my residence at a distance of about thirty feet from my front door. By reason of this fortunate proximity I was able to make daily observations of the home life of this species, the results of which are here presented.

It should be stated that, prior to the occurrence of this nesting, I had not, to my knowledge, observed a Philadelphia Vireo in life, and that I possess no distinct recollection of mounted specimens which I may have seen. Nevertheless, as these adult nesting birds were repeatedly observed by me, with the aid of opera-